

④

**December 1988**

**An Investigation Conducted By  
Technology Application Group  
Sponsored By Naval Facilities  
Engineering Command**

**AD-A205 009**

**ABSTRACT** MIDAS is a computer-aided design tool for drafting fleet mooring assembly drawings on the Computervision CDS 4000 System. This reference manual includes a description of an extensive library of mooring components.

**Keywords:** Computer aided drafting; Mooring design; Computer graphics; Fleet moorings; Iconic menus. (edc) ←

DTIC  
ELECTE  
FEB 28 1989

NAVAL CIVIL ENGINEERING LABORATORY.  
PORT HUENEME, CALIFORNIA 93043-5003

Approved for public release, distribution is unlimited

89 2 28 009

Unclassified

REPORT DOCUMENTATION PAGE	
REPORT NUMBER	CR 89.003
TITLE	Mooring Interactive Detailing and Assembly System (MIDAS) Reference Manual, Rev. 1.2
AUTHOR	Robert A. McGill
PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	Technology Application Group (TAG) 3561 Howard Ave, Ste 203A Los Alamitos, CA 90720
PERFORMING ORGANIZATION NUMBER	53-060
CONTROLLING OFFICE NAME AND ADDRESS	Naval Civil Engineering Laboratory (NCEL) Port Hueneme, CA 93043-5003
CONTROLLING OFFICE NUMBER	December 1988
MONITORING AGENCY NAME AND ADDRESS	Naval Facilities Engineering Command 200 Stovall Street Alexandria, VA 22332-2300
MONITORING AGENCY NUMBER	Unclassified
Approved for public release; distribution is unlimited.	
Points of Contact: TAG: Bob McGill (213) 436-0700 NCEL: Robert Zueck (805) 950-5355	
Computer-aided drafting; mooring design; fleet moorings, iconic menus, Computervision CDS 4000	
MIDAS is a computer-aided design tool for drafting fleet mooring assembly drawings on the Computervision CDS 4000 System. This reference manual includes a description of an extensive library of mooring components.	

DD FORM 1473

Unclassified

## NOTICE

The information contained in this manual is subject to change without notice. Technology Application Group shall not be liable for technical or editorial omissions made herein; nor for the incidental or consequential damages resulting from the furnishing or use of this material.

(C) Copyright 1987, Technology Application Group. All Rights reserved. The contractor has been authorized to copy this document for internal use.

CADDs, CADDs4X, CDS4000, and Designer VX are registered trademarks of Computervision Corporation.

PostScript is a registered trademark of Adobe Systems, Inc.

Accession For	
NTIS CRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution	
Availability Codes	
Dist	Avail and/or Special
A-1	



## TABLE OF CONTENTS

---

<b>INTRODUCTION.....</b>	<b>1</b>
<b>WELCOME TO MIDAS.....</b>	<b>1</b>
If you still need help.....	1
<b>ABOUT THIS MANUAL .....</b>	<b>2</b>
<b>FINDING YOUR WAY .....</b>	<b>2</b>
Typed Commands .....	2
<b>GETTING STARTED .....</b>	<b>3</b>
<b>ACTIVATING/DEACTIVATING MIDAS .....</b>	<b>3</b>
Deactivating MIDAS .....	3
Refresh Command.....	3
Hardware Considerations.....	3
<b>INPUT OPERATIONS.....</b>	<b>4</b>
The Cursor.....	4
Keyboard .....	4
Cancelling a Typed Entry - ^Q .....	4
Cancelling a Routine - ESC Q .....	5
Dynamic Variables.....	5
Tablet Menus.....	5
Status Text and Dynamic Menus.....	5
<b>USING THE MIDAS MENUS .....</b>	<b>6</b>
Stacked Menus and Panel Menus .....	6
Types of Icons .....	6
<b>BASICS OF MIDAS .....</b>	<b>7</b>
<b>DEFINITIONS .....</b>	<b>7</b>
<b>MIDAS SUBSYSTEMS OVERVIEW.....</b>	<b>8</b>
The MIDAS Menu System .....	8
The Mooring Assemblies .....	8
The Mooring Model .....	9
The MIDAS Library.....	10
<b>THE MAIN MENU .....</b>	<b>12</b>

<b>THE 2D MOORING ASSEMBLIES .....</b>	<b>14</b>
<b>THE ASSEMBLY MENU .....</b>	<b>14</b>
<b>THE COMPONENT INVENTORY MENU .....</b>	<b>16</b>
Saving Assemblies.....	16
<b>COMPONENT SELECTION MENUS .....</b>	<b>18</b>
Component Size.....	18
Layers.....	18
Odd Length Chain .....	20
"Hidden-Line-Removal".....	21
Assemblies at Odd Angles.....	21
Scaled Assemblies .....	21
Assemblies That Don't Fit.....	21
Moving Assemblies .....	22
<b>VERIFYING ASSEMBLIES .....</b>	<b>24</b>
<b>ASSEMBLY VERIFICATION MENU .....</b>	<b>24</b>
Verifying By Assembly Name .....	24
Updating the Assembly Table .....	24
Verifying By Assembly Layer .....	24
Point-to-Point Verification .....	24
Dimensioning An Assembly.....	26
Length and Weight .....	26
Attachment Check .....	27
<b>RELATIONSHIP TO THE MODEL.....</b>	<b>27</b>
<b>THE MIDAS DRAWING.....</b>	<b>28</b>
<b>THE SKETCH MENU.....</b>	<b>28</b>
<b>THE COMPONENT FIGURES .....</b>	<b>30</b>
<b>THE FIGURE GRAPHICS.....</b>	<b>31</b>
Mating Components .....	31
<b>PLOTTING THE DRAWING .....</b>	<b>32</b>
<b>DRAWING TOOLS MENU.....</b>	<b>34</b>
<b>FIND NUMBER BUBBLES .....</b>	<b>36</b>
Moving/Rotating a Bubble .....	36
Bill of Materials.....	36

<b>THE MOORING MODEL.....</b>	<b>3</b>
The Assembly Table Graphics.....	38
<b>THE ASSEMBLY TABLE MENU .....</b>	<b>38</b>
<b>READING THE TABLE.....</b>	<b>40</b>
Catenary Curves.....	41
<b>EDITING THE TABLE .....</b>	<b>42</b>
<b>USING THE MODEL FOR CAE .....</b>	<b>44</b>
<b>APPENDIX A - TROUBLE SHOOTING.....</b>	<b>46</b>
Menus Disappear.....	46
Menus Graphics Are Overwritten.....	46
Can't Activate Dynamic Menus.....	46
CII Keypad Doesn't work.....	46
Menu Tabs Overlap Top Menu.....	46
Menus Do Not Respond.....	47
Menus Are Out Of Place.....	47
CADDs Graphics Hidden After Zoom Draw.....	47
Menu Text Garbled.....	47
Menus Arcs Appear As Polygons.....	47
Extra Lines Appear Across the Screen .....	47
Menus are Incomplete.....	48
Menu Graphics Do Not Match the Commands .....	48
<b>APPENDIX B - FIGURE BUILDING .....</b>	<b>49</b>
<b>CONNECTIONS AND CNODES .....</b>	<b>51</b>
Relationship to Attachment Check .....	51
<b>SPECIAL CASE COMPONENT FIGURES .....</b>	<b>52</b>
Ground Rings, Spider Plates, Equalizers, Etc.....	52
Variable Length Components .....	52
Non-Reversible Components .....	53
<b>DESCRIPTION FILE .....</b>	<b>54</b>
Alphanumeric Data .....	54
Numeric Data .....	54
Field Format .....	55
Comments Within the File .....	55
Assigned Fields .....	55
<b>SAMPLE DESCRIPTION FILE ENTRY. ....</b>	<b>56</b>

**APPENDIX C - TECHNICAL NOTES ..... 57**

---

**INSTALLING MIDAS.....57**

**Hardware Considerations .....58**

**CATALOGS USED .....59**

---

## INTRODUCTION

---

---

### WELCOME TO MIDAS

---

MIDAS streamlines a wide variety of tasks related to the production of fleet mooring assembly drawings. The use of standardized mooring component figures minimizes drawing time, and an automatic parts list generator ensures an accurate component count. Moorings designed using the MIDAS system can be automatically verified for component fit, total weight, total length, and ultimate breaking strength. MIDAS will also build an accurate three dimensional model of the mooring for use by subsequent mooring analysis programs.

MIDAS has been designed for use by persons having less than 40 hours of basic CADDs training and less than 160 hours of additional system use. Users with less training should be able to produce assembly drawings with only minimal outside help.

MIDAS is a special user environment on top of the standard CADDs graphic system. There is nothing you can do in CADDs that you can't do when using MIDAS. MIDAS can be used alone or in conjunction with the standard tablet menu, so trained CADDs users can use MIDAS as a supplement to their favorite keyfiles.

MIDAS gets its power from a special library of mooring component figures, accessed, positioned and managed by an intelligent iconic menu system. Once placed into an assembly drawing, the components can be repositioned, edited or deleted just like any other CADDs figure. We have tried to cover most of the typical user tasks in this manual, but if you can't find the information you need in this manual, check the Computervision CADDs User Manual.



## ABOUT THIS MANUAL

---

---

### FINDING YOUR WAY

---

The section entitled GETTING STARTED covers the activation of MIDAS and a brief description of the underlying concepts and basic input operations.

The section on USING THE MIDAS MENUS gives a brief description of the user interface components.

The section on the BASICS OF MIDAS provides definition and a synopsis of the four major subsystems.

The section on THE 2D MOORING ASSEMBLIES covers the concepts behind assemblies, how to build them and their relation to the model.

VERIFYING ASSEMBLIES describes how to check each assembly for length, weight, breaking strength and fit.

The section entitled THE MIDAS DRAWING covers the Sketch Menu, the characteristics of the library components, the Draw Menu and the Plot Menu.

The section entitled THE MOORING MODEL describes the purpose of the three dimensional mooring model and the Assembly Table.

Appendix A contains details on building MIDAS component figures, and Appendix B contains MIDAS loading instructions and a list of the catalogs used by MIDAS.

#### Typed Commands

---

In a few cases, it will be necessary to use the keyboard to type a command. All keyboard input will be designated in this manual by the symbol ">>" followed by the required text shown in capital letters as follows:

» REQUIRED TEXT <CR>

The <CR> simply indicates that a carriage return is expected.

## GETTING STARTED

### ACTIVATING/DEACTIVATING MIDAS

To install MIDAS, refer to Appendix C. Once MIDAS has been installed, it is fully operational.

(1) Enter CADDs normally by typing:

» CADDs <CR>

(2) At the CADDs prompt, activate MIDAS by typing:

» ACTIVATE MIDAS <CR>

The MIDAS Main menu will appear on the right hand side of the screen. As soon as it appears, MIDAS is ready for use.

#### Deactivating MIDAS

MIDAS, and all other iconic menus which run on the CII system, can be deactivated by typing:

» DEACTIVATE CII <CR>

The screen will be repainted and the menus will no longer be visible.

#### Refresh Command

(3) If at any point, the menus are no longer visible, such as after activating a CADDs part, restore the menus by typing:

» REFRESH <CR>

#### Hardware Considerations

The MIDAS menus require the Computervision DCU workstation. MIDAS does not require an APU. All other workstation peripherals, such as the keyboard and the tablet, can be active at the same time. There are no other hardware requirements.

## INPUT OPERATIONS

---

### INPUT OPERATIONS

---

#### The Cursor

---

The cursor, typically displayed as full screen cross-hairs, is the pointing device used to select items on the screen. The cursor is moved about on the screen by moving the pen in the graphics area of the tablet.

Throughout this manual, the term "select" is used. Items are "selected" by placing the cursor anywhere inside of the icon and then pushing the lower button of the stylus once. This is known as a "digitize". Placement of the cursor is not critical as long as the intersection of the cross-hairs lies within the visual boundary of the icon to be selected.

**NOTE:** MIDAS uses only the lower button of the pen for selection. At any point during a CADDs command, the cursor may be moved into the MIDAS menu area and new menu pages can be selected. CADDs is not directly affected by changing menu pages.

#### Keyboard

---

The keyboard may be used for input at any time while MIDAS is activated.

#### Cancelling a Typed Entry - ^Q

---

To cancel or abort a command which has been typed onto the command line, or is waiting for input from the user, type:

» [CTRL] Q

**NOTE :** You will notice that all icons have an embedded ^Q at their start. If a command is waiting for input when a second icon is pressed, the first command will be cancelled and the second command output to CADDs. This ensures that the second command is not stacked on top of the first which would cause an error.

**Cancelling a Routine - ESC Q**

MIDAS contains several routines in the Assembly verification section. To halt a routine which has been started, press the escape key followed by Q:

- » [ESC] Q

**Dynamic Variables**

In some instances, MIDAS will pause during the execution of a command and wait for input from the operator. This is known as a dynamic menu variable, or "DMVAR". The user is prompted with the special character ---> which indicates that input is requested from the keyboard or tablet only. The MIDAS menus cannot be used as input to a DMVAR. The command continues when the user enters a carriage return (CR), signifying the end of the input.

**Tablet Menus**

Like the keyboard, the tablet menu may be active while MIDAS is active. Existing keyfiles can be used as input during any menu operation.

**Status Text and Dynamic Menus**

When activated, MIDAS requires that the status text be active. This means the status text switch on the ICU box must be turned on at all times. If desired, the status text may be turned off through the use of the environment pulldown in the topmost menu.

MIDAS utilizes the same support system as the regular CADDs dynamic menus. Hence, only one menu system can be active at any one time. If there is a need to activate an existing dynamic menu while MIDAS is active, simply deactivate MIDAS and use the dynamic menu as usual.

## USING THE MIDAS MENU

## USING THE MIDAS MENU

MIDAS utilizes two basic types of menus and three types of icons.

### Stacked Menus and Panel Menus

Most of the MIDAS commands are contained in Stacked menus. Stacked menus are distinguished by the "tabs" that appear at the top of the menu. Menu tabs are selectable. When two or more tabs are displayed at the top of a menu, you may backtrack to a previous menu by selecting the desired tab.

At the top and bottom of the screen you will find menus of a slightly different type known as panel menus. Panel menus behave much the same way as a stacked menu, except that no tabs are displayed.

### Types of Icons



**Standard Icon** - immediate execution of a command.

**Bent corner Icon** - these icons contain a folded lower right corner and provide access to another menu.

**Pulldown Icon** - these icons contain a small arrow in the lower right corner. The arrow indicates that more selections will appear immediately below the icon when selected. These additional selections are known as a pulldown option list.

---

**BASICS OF MIDAS**

---

---

**DEFINITIONS**

---

**Hardpoint** - A critical junction in a mooring which indicates a potential discontinuity in catenary shape, often caused by a buoy, ground ring, sinker or anchor.

**Assemblies** - The two dimensional assemblage of hardware such as buoys, links, chains and ground rings which connect two hardpoints.

**Assembly Table** - A table containing pertinent geometric, connectivity, and material data for all of the assemblies in the model.

**Model** - A group of lines or splines which connect the model's hardpoints to represent the three dimensional model of the mooring. The model can be used to show either the user-specified mooring geometry, or the actual mooring shape as computed from the 2D assemblies. The model is not required to build assemblies.

**Figures** - Used in CADDs to group individual geometric entities such as lines and arcs into identifiable components. MIDAS uses Extended Nodal Figures to represent the library of hardware components. Extended Nodal Figures can be inserted and manipulated as a group, but allow each entity within the group to be edited individually to facilitate detail changes after insertion onto the assembly.

## MIDAS SUBSYSTEMS OVERVIEW

---

## MIDAS SUBSYSTEMS OVERVIEW

---

MIDAS consists of four interdependent systems, the menus, the assemblies, the model, and the component library. To give you a feel for how they relate to one another, a brief description of each is provided below.

### The MIDAS Menu System

The iconic menus are designed to assist the average CADD user. The complexity of CADD is reduced by embedding much of the required CADD syntax into the menus in much the same manner as a tablet keyfile. In fact, the iconic menus work well as a on-screen supplement to tablet keyfiles.

In addition to providing easy access to a wide range of CADD capabilities, the iconic menus are the essential link between the three dimensional mooring model and the two dimensional assemblies. Assemblies are organized according to hardpoint name and layer. The menus manage the layer information so that each assembly component is inserted on the proper layer. As long as the names and layers are consistent, the system can be assured of associating the right assembly with the right hardpoints.

The MIDAS menus are designed to streamline the various tasks involved in producing a finished assembly drawing. The chapters of this manual are also designed to correspond to these tasks, hence, each chapter is headed by a picture of the appropriate menu and a description of the icons contained in the menu.

### The Mooring Assemblies

An assembly is defined as the linear collection of hardware which connects two (and only two) hardpoints. A riser assembly would typically be made up of a buoy, a swivel, shots of chain, connecting links and a ground ring. There can be no hardpoints within an assembly.

Within MIDAS, an assembly is a collection of two-dimensional extended nodal figures which are assembled on a common layer. By convention, each component figure is

assembled starting from a hardpoint near the surface to a hardpoint near the sea floor until the assembly is complete. Assembly verification, such as breaking strength and total weight, is performed on all the connected figures found on a particular layer.

---

**The Mooring Model**

---

A mooring model is made up of several assemblies connected together at specific geometric locations known as hardpoints. A mooring model contains several interconnected assemblies such as risers and legs. The end points of each assembly, such as buoys, ground rings, sinkers and anchors are all located at hardpoints.

The location of each hardpoint, along with the length and weight of each mooring assembly must first be determined from mooring design calculations based on surface conditions at the buoy, depth of the water, size of the vessel, etc. This information is entered manually into an assembly table contained within each mooring drawing. MIDAS can build a three dimensional wireframe model of the mooring using the tabulated data. A line or spline will be drawn between each hardpoint corresponding to an individual assembly. This preliminary model represents the "optimal" geometry of the mooring.

The goal is to assemble actual library components into assemblies which approximate this optimal geometry. Assemblies are built up and verified to determine their lengths and weight using MIDAS. When these "actual" values are sufficiently close to the optimal values, MIDAS can be used replace the original assembly table entries for length and weight with the calculated "actual" values. The assembly is then "hung" onto the original hardpoint locations and rudimentary catenary shapes are calculated by MIDAS. Catenaries which differ significantly from the optimal shapes should be reviewed.

The "actual" model serves as an accurate three dimensional representation of the mooring as it will be installed. This model can be used to generate geometric location data needed for additional analysis such as finite element modeling.



### **The MIDAS Library**

---

Each hardware component used to assemble GEMS fleet moorings is available from the MIDAS figure library. These components are stored as draw mode extended nodal figures, combining the convenience of figure handling, with the ability to edit the individual lines and arcs contained within the figure. Each figure has two or more connection points corresponding to the point at which they contact mating pieces of hardware. Each figure has a CADDs connect node at each connection point for placement purposes.

The origin of each figure is located at the connection point which is located nearest the sea surface when assembled. Many components do not have an implicit direction, and therefore can be placed with their origin at either end. Each new figure is inserted at the connect node of the previous figure.

To make this work, a convention has been established such that all assemblies shall be assembled starting from the component nearest the sea surface and working downward. For example, the first component of a riser assembly is the buoy. Chains and connecting links are added until the ground ring is reached.

In addition to the graphic figure, each component has a list of attributes which fully describe it. These attributes specify purchasing requirements such as vendor and cost, shipping requirements such as weight and volume, and physical characteristics such as breaking load, and wet weight, length and connection dimensions. The attributes are located in a central file which contains all of the attributes for all the components in the library. This file is known as the "Description File" and is accessed by the MIDAS software during the verification of the completed assemblies.

## MIDAS SUBSYSTEMS OVERVIEW

(Blank Page)

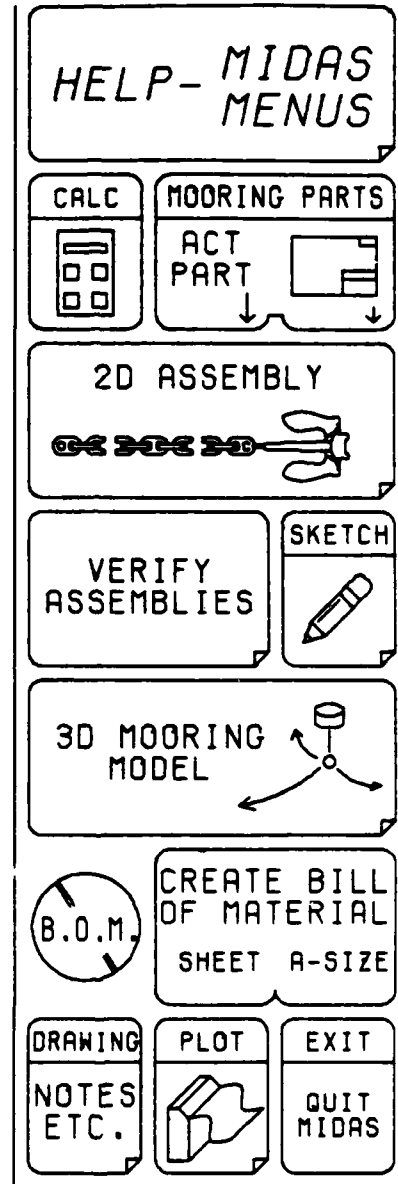
## **THE MAIN MENU**

---

Once MIDAS is activated, the MIDAS Main Menu will appear on the right side of your screen.

On the Main Menu, you will find icons to perform the following functions:

- On-line Help for the MIDAS Menus
- Accessing MIDAS parts and drawings
- Access to the 2D Mooring Assembly menus.
- Access to Assembly Verification menus.
- Access to the Sketch Menu.
- Easy deletion of existing B.O.M. text
- Pushbutton creation of Bill of Materials.
- Access to the Mooring Model menus.
- Access to a Drawing Menu
- Access to a Plotting Menu
- Exit MIDAS.



Main Menu

## THE 2D MOORING ASSEMBLIES

---

An assembly is defined as the linear collection of mooring hardware which connects two hardpoints. Each mooring has two primary types of assemblies;

- risers, and
- legs.

---

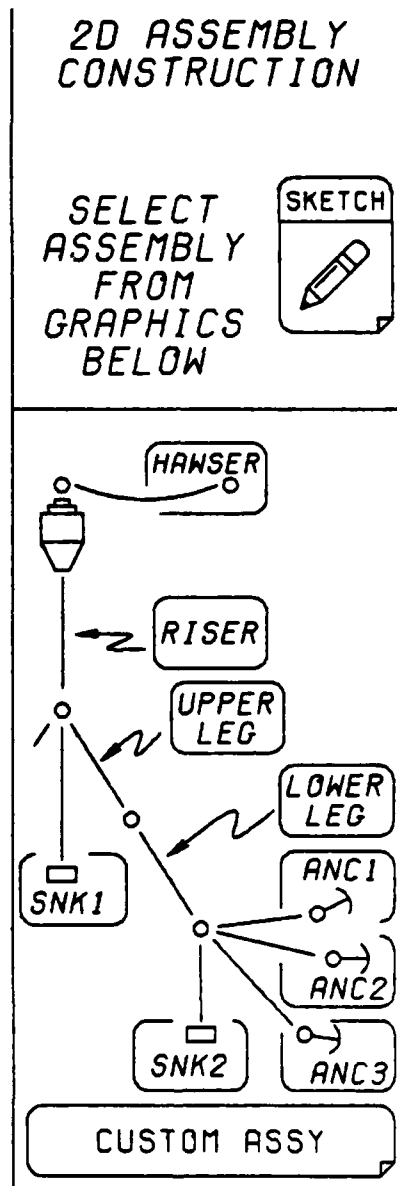
### THE ASSEMBLY MENU

---

When you enter the assembly component menu, you will see the menu at the right. The picture presents the various combinations possible for a single leg of a mooring assembly. Up to six legs containing any combination of assemblies can be easily handled by MIDAS.

Selections are made by pointing to the desired assembly in the "SuperIcon" picture and selecting with the cursor. A pulldown menu will appear containing the choices for that assembly. Once you have made your selection, MIDAS will shift you to the Component Selection menus.

If you are not building a standard assembly, or are building an assembly that is not oriented horizontally or vertically on the drawing, select the "Custom Assembly" icon at the bottom of the menu. It will ask you for the layer and angle to be used for this assembly. Be sure to keep the layering consistent with that listed in the Assembly Table as discussed in the chapter entitled Mooring Model.



Assembly Menu

## THE COMPONENT INVENTORY MENU

---

### THE COMPONENT INVENTORY MENU

---

Once you have selected an assembly from the Assembly Menu, you are ready to insert MIDAS components. The Component Inventory Menu shows all of the component categories available. This menu also contains a "Save Assembly" icon used for saving or restoring any assembly. (Drawing details are available from the "Drawing Aids" menu.)

The first component of the assembly will usually be a connecting link in the case of legs and sinkers, and a buoy in the case of the riser. Select the appropriate component category and the Component Selection Menus will appear.

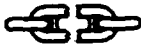







#### Saving Assemblies

---

Assemblies are a linear collection of extended nodal figures on a given layer. They are saved by constructing a part containing the components of interest. The "SAVE ASSEMBLY" icon will construct a part and ask for an origin for the new part. Digitize the origin of the first figure of the assembly. (It will be necessary to implement a standardized naming convention which indicates how each assembly is unique.) These newly saved assemblies can be reinserted into the same part or another part by using the "RESTORE ASSEMBLY" icon.

**NOTE:** To avoid overlapping existing work, be sure to select a new layer and note the orientation. Horizontal assemblies will be inserted to the right of the digitize, vertical assemblies will be inserted below the digitize.

THE COMPONENT INVENTORY MENU

CHAIN ETC. 	
ANCHR 	BUOY 
LINK 	CLUMP 
SWIVEL 	SHKL 
WIRE 	MISC. FTNGS
SAVE ASSY	
SAVE WIN: ↓	RESTORE ↓

**Component Inventory Menu**



## COMPONENT SELECTION MENUS

---

### COMPONENT SELECTION MENUS

---

Within each component category, there are several components available for selection. Select the appropriate size and the component of choice, then digitize a location in the drawing.

#### Component Size

---

On many Component Selection pages, you will find a "Size" icon. Select the size of the components you are using (2", 2.25", etc.). This will set the variable **SIZE** to this value. All subsequent component selections will be of the same size until the size is reset. This speeds up the insertion of matched components.

**NOTE:** All figure insertion commands are automatically preceded by a **CNODE** mask in **GETDATA** to ensure accurate positioning with respect to the previous figure. When inserting the first figure of an assembly, select the **LOC** icon from the bottom menu to override the **CNODE** mask because you will be placing it at an arbitrary location on the drawing. If the terminal beeps when inserting figures, select the **REPAINT** icon on the bottom menu to make sure that the appropriate layers are visible.

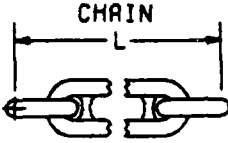


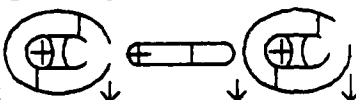

**NOTE:** **CNODES** and **NFIGS** are represented by a diamond and a bulls-eye symbol respectively. These symbols **MUST** be visible for **MIDAS** to work correctly. For better visualization, however, they may be turned off temporarily. A small dot will remain.

#### Layers

---

Each assembly in **MIDAS** must be placed on a unique layer for the verification routines to work properly. Normally, the menu system will handle the layering for you. If you are building a non-conventional assembly which has not been assigned a standard layer, place all components of the assembly on the same layer by selecting the layer before inserting the components.

# COMPONENT SELECTION MENUS

SELECT SIZE	
2.50 2.75 ETC.	
↓	
	
↓	
CHAIN JOINING LINK	
	
↓	
ANCHOR JOINING LINK	
	
↓	
ODD LENGTH CHAIN	
ASSIGN LENGTH	CHANGE ##
UPDATE PROP	
↓	
ECHO SYMBOL	SKETCH
ON OFF	

Typical Component Selection Menu

## COMPONENT SELECTION MENUS

---

When verifying this assembly (See section Verifying Assemblies), select the "Custom Assembly" icon at the bottom of the menu and select a layer number for the assembly. This will automatically set the layer variable to the desired layer. Since this is a normal VARPRO variable &LAY, it can be redefined at any time. For example, to enable the verification routines to check the components on layer 16, type:

LET &LAY=16 <CR>

**NOTE :** All CADDs variables, known as VARPRO variables, are preceded by "&" in CADDs naming conventions.

### Odd Length Chain

---

MIDAS provides for inserting odd chain lengths other than 90'. Because these lengths are not known prior to insertion, the chain is inserted and changed to reflect the desired length. There are icons provided for this purpose.

- 1) Select the icon labelled "Assign Length" and type in the desired value at the ---> prompt, then select the chain figure origin. This will update a property of the figure to this new value.
- 2) Select the icon "Change ##" and type in the new length and select the dimension text. Use this same procedure to change the find number text in the bubble to the correct number. This will not affect the Bill of Materials, however, so be sure to edit the resulting B.O.M. text to reflect this change.
- 3) You must update the property for the text in the dimension and the bubble after you change them. To do this, select the icon "Update Prop" and select the two text entities.
- 4) A negative value has been entered in the description file for odd lengths indicating lbs/ft, hence the weight will be computed correctly by using the value assigned in Step 1.

### **"Hidden-Line-Removal"**

---

Successive components are selected and placed into the drawing by digitizing the trailing CNODE of the previously inserted figure. To make the "hidden line removal" work, each figure has been designed to "mate" with the other figures. A problem sometimes arises when mixing and matching odd components such as connecting links and ground rings or anchors. If the figures don't appear to match, try a different view of the link. If it still doesn't work out, trim the offending entities to suit. If its a common problem, it may be worthwhile to convince your manager to create a custom figure.

### **Assemblies at Odd Angles**

---

A key feature of the MIDAS system is the ability to insert figures at any angle on the drawing. The same figure can be used for horizontal legs, vertical risers and sinkers, and assemblies built at any angle in between. In the case of legs and risers, the angle is automatically set to reflect the normal presentation.

If a new angle is required, specify the desired angle as measured from horizontal. The angle is maintained as the VARPRO variable &ANG, so this can be reassigned at any time. For example, to set the angle to 30 degrees, type:

» LET &ANG=30

### **Scaled Assemblies**

---

MIDAS is designed such that all figures are inserted at full scale. This ensures that the bubbles and dimensions will conform to drafting standards. If it is necessary to change the scale of an assembly, you will have to change the bubble and dimensions graphics or insert new ones. A standard bubble figure is provided to help this situation.

### **Assemblies That Don't Fit**

---

Assemblies which must be broken into two or more separate segments to fit on a drawing, or exist on separate drawings within a "super-drawing" can still be assembled. When you have run out of room to attach additional com-

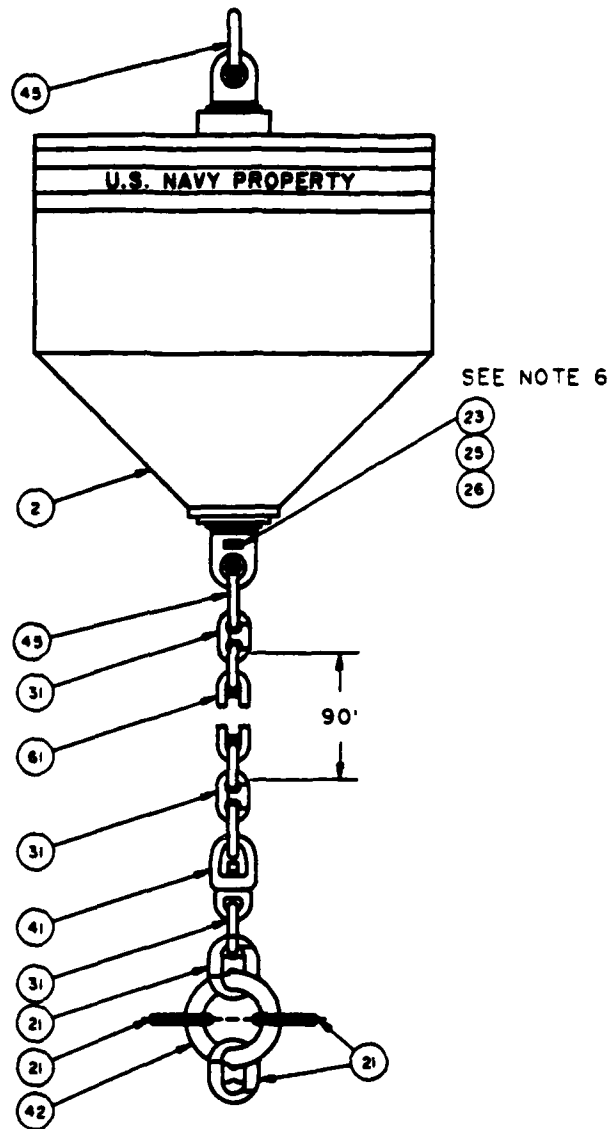
ponents directly, continue at another location on the drawing, using the LOC icon in GETDATA for the first component in the continuation.

To verify this "broken" assembly as a single assembly (See section on Verifying Assemblies), locate the "Nodal Line" icon in the verification menus to insert a nodal line between the last connect node of the previous assembly segment and the first connect node of the continuing segment of the assembly. The code will automatically trace along the nodal line to find the rest of the figures.

### Moving Assemblies

Once components have been inserted onto the appropriate layer, the figures can be translated, rotated or deleted just like any other CADDs figure. The Sketch Menu is provided for this purpose.

**NOTE:** To translate a whole figure, you must use the NFIG modifier in GETDATA, otherwise, only the individual entities will be moved. At the time of this writing, the CADDs dimensions used to define the bubble text cannot be copied when using the TRANSLATE command with the COPY modifier. To create new assemblies from existing assemblies, use the SAVE ASSEMBLY and RESTORE ASSEMBLY icons as described in the section SAVING ASSEMBLIES.



Sample MIDAS Assembly

## VERIFYING ASSEMBLIES

---

---

ASSEMBLY VERIFICATION MENU

---

---

### Verifying By Assembly Name

---

The assembly verification menu page uses the same mooring "supericon" to select the assembly for verification. Select the appropriate assembly from the menu pulldowns. MIDAS will set the layer to that of the selected assembly.

Next, select the icon "Verify Assembly - Print Only" to verify all figures found on that layer. If figures are found on the same layer, but are not connected to the indicated assembly, a warning will be issued. The results will be retained regardless to allow for incremental checks of incomplete or partially exploded assemblies.

---

### Updating the Assembly Table

---

If you have built an assembly table for this mooring, the MIDAS will update the entries for length and weight based on the results of the verification. If you wish to update the table, select the icon "Verify Assembly and Update Table".

---

### Verifying By Assembly Layer

---

If the name of the assembly is not available, select the icon "Assy - Select Ent" and select one of the figures in the desired assembly. The system will check all figures found on the same layer as the selected figure.

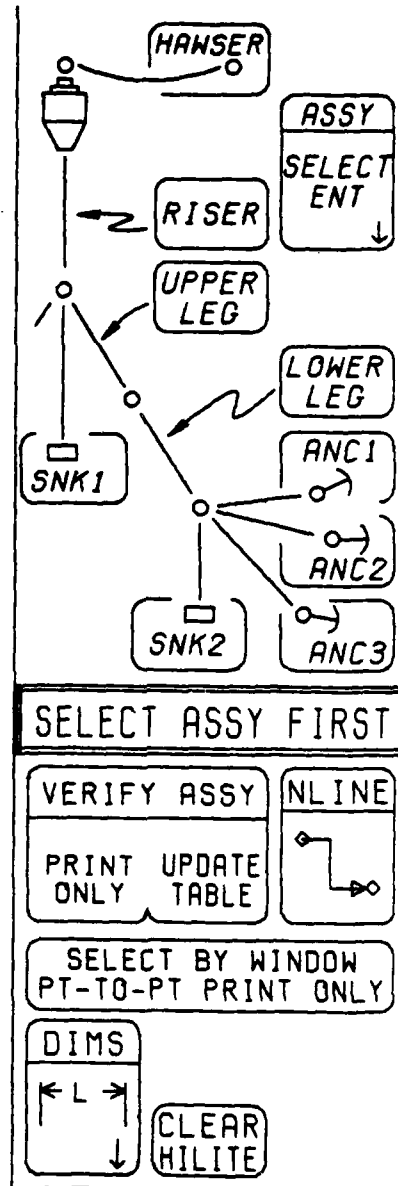
---

### Point-to-Point Verification

---

When verifying only a portion of an assembly, select the icon "Select By Window, Point-to-Point". You will be asked to select the components of interest. Only those figures selected will be verified.

# ASSEMBLY VERIFICATION MENU



Assembly Verification Menu



## ASSEMBLY VERIFICATION MENU

**NOTE :** If the components selected contain a branch such as a ground ring, spider plate or equalizer, the verification routine will output correct values for weight and breaking strength, and will perform a proper fit check, but will output a length that is equal to the sum of ALL components. This will **NOT** be a valid length for the assemblies and should **NOT** be used to dimension the assembly.

**NOTE :** Due to the incorrect length value, it is not possible to update the Assembly Table based on a Point-to-Point verification. Update applies to single, complete assemblies only.

### Dimensioning An Assembly

The CADDs system uses actual coordinates to drive its dimensioning system. The shots of chain inserted in the MIDAS assemblies are only a few inches long, however, not 90 feet. Hence, we have to lie to the dimensioning system. This is accomplished by first verifying the assembly, or section of assembly that you wish to dimension. This will calculate the cumulative length of the figures selected and assign this value to a preset VARPRO variable &LENGTH.

Using the "Dimension" icon in the menus and selecting either orientation, digitize the origin of the first figure, the connect node of the last figure and the desired location of the dimension text. The system will read the dimension variable &LENGTH and display this value in the main text of the dimension.

**NOTE :** The dimension text will always reflect the length of the **LAST** assembly verified. Be sure to verify each assembly or portion of assembly immediately prior to dimensioning it.

### Length and Weight

Once an assembly has been verified, MIDAS will print out its characteristics to the screen. The critical characteristics of length and weight can be optionally updated into the assembly table when desired so that the next time a catenary

---

## RELATIONSHIP TO THE MODEL

is run, the model will reflect the new "actual" assembly geometries. Those assemblies which have not been verified will retain their original as-designed values.

---

### Attachment Check

All assemblies are checked for attachment compatibility between each mooring components. This check compares the nominal opening of one component with the nominal section of the adjacent component. These attachment dimensions are found in the component Description File described later.

Some components such as anchor connecting links are designed to connect small diameter chain with larger diameter shackles or ground rings. To eliminate the need to align these components individually in the assembly drawing, MIDAS automatically checks both ends of these components to determine fit. If the component will fit if assembled in the other direction, MIDAS will OK the connection.

**NOTE :** Any failure in the attachment check will cause the program to halt and an error message will be printed.

Components which fail the attachment check will be highlighted in red. The command MARK ENT CLEAR ALL is provided in the MIDAS menus to remove this highlight.

---

## RELATIONSHIP TO THE MODEL

Using MIDAS, you can build perfectly valid assemblies, create assembly drawings and parts lists, and compute the length, strengths and overall weight of the assemblies without first having built a three dimensional model of the mooring. This ensures that nearly all of the features of MIDAS are useful in the absence of three-dimensional model information.

If the Assembly Table has been filled out with all relevant mooring data, MIDAS can update the table values for length and weight for each assembly. This provides a true link between the 2D assemblies and the 3D model.

## THE MIDAS DRAWING

---

---

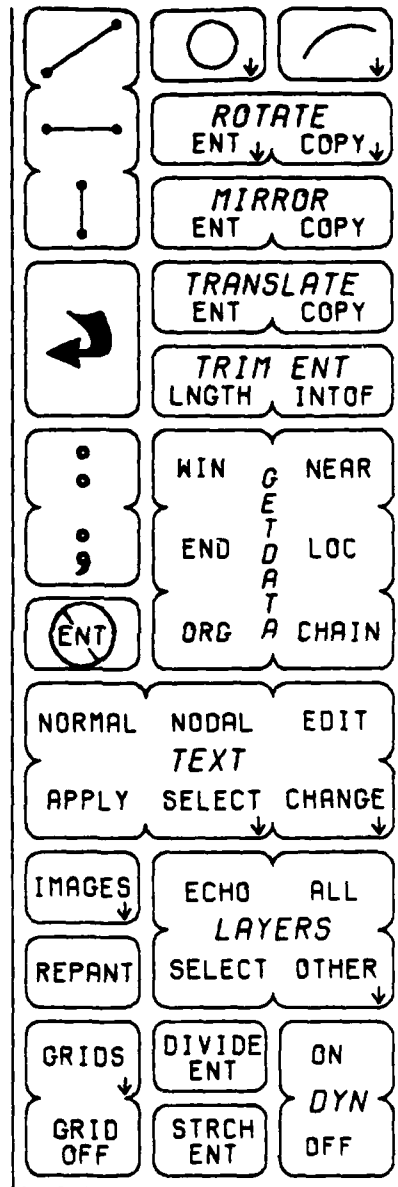
### THE SKETCH MENU

---

The Sketch menu contains many of the commands needed for editing the component geometries, trimming, moving, rotating, and mirroring entities. Icons are available for inserting lines, arcs, circles, text and nodal text. A selection of GETDATA masks are presented, as are icons for editing text, changing layers and displaying drawing images.

A Select Dynamics icon is available which will allow for dynamic repositioning of entities such as bubble text. When using the dynamics, select the icon for "Translate Ent", then select the entities to be moved and finish your selection with a semi-colon. When the graphics turn green, use the top button on the stylus to move the entities. Drop the group by selecting a location with the bottom button on the stylus.

**NOTE:** Always turn dynamics off when you are finished translating. Dynamics will confuse almost every other operation if left activated.



The Sketch Menu

THE COMPONENT FIGURES

---

MIDAS derives much of its power from the use of intelligent component library figures. Each component used in MIDAS is a drawing mode extended nodal figure (If you are unfamiliar with nodal figures, it might be helpful to review the CADDs figure reference manual.)

Figures are a useful method of grouping CADDs graphic entities into an effective library part. MIDAS utilizes drawing mode extended nodal figures to take advantage of the following traits:

- Ability to identify and move the complete figure after insertion.
- Ability to edit (trim, delete, etc.) individual entities contained within the figure after insertion.
- Ability to carry nodal information, in this case connect nodes.
- Ability to construct a part containing several figures without loss of data.
- Ability to automatically generate a bill of material from the drawing. This bill of material is keyed to the "find number" of each component which is a property of each figure.

Most commonly used mooring components have been included in the MIDAS library, hence you will not be required to build new figures. When a new figure is required, refer to Appendix A entitled "Figure Building".

---

THE FIGURE GRAPHICS

---

Most MIDAS components are built so that they are inserted at full scale. Relative dimensions from the components are used to develop the individual figure profiles, but all MIDAS drawings should be considered **NOT TO SCALE**.

---

**Mating Components**

---

Since all the parts must mate with the other components of a given assembly to effect the "hidden line removed" appearance, a standard gap opening and mating section have been used. This allows a single connecting link figure to mate with different size chain figures. The assembly verification routines will find any assembly interference problems.

## PLOTTING THE DRAWING

---

### PLOTTING THE DRAWING

---

A Plot menu is provided in MIDAS which will make plotting the drawing easier. It is assumed that the drawing will be plotted on a 36 inch Versatec electrostatic plotter. Icons are provided for the following functions:

- Echo the 3D model On or Off
- Echo the Assembly Table On or Off
- Echo the TNODE, CNODE, and NFIG symbols On or Off
- Find all dimensions and bubbles and change them to layer 220. This will cause them to be highlighted in red. Use the "Clear" icon to clear this highlight.
- Echo dimensions and bubbles On or Off
- Echo the drawing form On or Off
- Echo layers and change entities to a different layer
- Plot the drawing at full scale, assigning a width of 4 to the component geometries. The drawing will be rotated on the plotter to fit.
- Plot a windowed section of the drawing.

ON MODEL OFF	ONLY TABLE OFF	ON SYMBL OFF
FIND BUBS/DIMS CLEAR	ON OFF	ON FORM OFF
ECHO LAYERS CHANG	ALL VERFY	
PLOT DOT ↓		
PLOT DOT WIN ↓		

The Plot Menu



## DRAWING TOOLS MENU


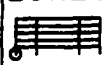



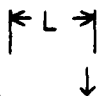
---

## DRAWING TOOLS MENU

---

A drawing tools sampler menu is included which contains typical drawing components useful for the fast creation of MIDAS drawings. Available from the menu are:

- Standard Find Number bubbles
- Additional BOM Table line graphics
- Access to the Sketch Menu
- Section arrows
- Dimensions
- Drawing text in two typical sizes
- Access to Drawing Detail Figures
- Access to Drawing Notes (If available)
- Turn Draw form On/Off
- Turn Component symbols On/Off

BUB 'L 	BOM LINES 	SKETCH 
ARROWS  		DIMS 
DRAWING TEXT ENTER TEXT <b>BIG</b> SMALL °          °		
DRAWING NOTES		
DRAWING DETAILS		
DRAW FORM ON OFF		
FIG SYMBOL ON OFF		

Drawing Tools Menu

---

## FIND NUMBER BUBBLES

---

---

## FIND NUMBER BUBBLES

---

### Moving/Rotating a Bubble

In most cases when a figure is inserted, the bubble will fall in line with the rest of the figure bubbles and there will be no need to move it. If, however, the bubble interferes with another bubble, simply move or rotate the bubble, along with its leader and arrowhead, to a new position.

To change the position of a bubble, rotate the bubble, the leader line and the arrowhead about the tip of the arrow to a new position. The text will remain horizontal. You may also stretch the bubble and its leader to a new location, then rotate the arrowhead to reflect the new position.

**NOTE:** The text within a bubble is non-associated draw mode dimension text. Occasionally, when you translate and rotate a figure, the text may drift slightly away from the center of the bubble. To correct this, translate the bubble text to the new position.

### Bill of Materials

An accurate Bill of Materials can be generated from the assemblies in a given drawing. All of the components in the drawing, including any that might be located on layers that are not currently echoed on will be counted. To create a BOM table on the drawing, press the BOM icon and select "Simple" on the pulldown. This will place drawing mode text entities at the location of the TNODE located in the BOM table area. If for any reason the routine is unable to find the TNODE, you may need to rename the TNODE by typing:

» TAG ENT ENT BOM: TNODE (select the TNODE)

If an assembly in the drawing is typical (TYP) of other assemblies not inserted in the drawing, as is often the case with leg assemblies, select one of the other choices in the BOM pulldown. The MIDAS BOM routine will allow up to three separate assemblies to be duplicated (TYP), and any number of duplicates to be counted.

## FIND NUMBER BUBBLES

Each figure has the property STOCKNO which represents the stock number of the component and matches the find number within the bubble. It is also the first field in the component description file. This number is a unique identifier which is referenced by the Bill of Materials package and should not be changed. The format of the stock number (AB#) is broken down as follows:

A = Component Category

B = Component Type

# = Component Size

## THE MOORING MODEL

---

MIDAS provides a link between the real world of building assemblies from available components and the ideal world of the engineering analysis. This link is represented by a table that is present in each mooring part called the Assembly Table.

### The Assembly Table Graphics

---

The assembly table is on layers 200-201 of the drawing and consists of 64 lines of text, each containing 11 text nodes and associated nodal text. Each text node is assigned a different property, according to its position in the table. The associated text is read by MIDAS and is used to build the three dimensional model.

Each line in the table is an independent figure and can be translated like any other figure. Unless it is absolutely necessary, however, it is not recommended that the Assembly Table be rearranged.

---

### THE ASSEMBLY TABLE MENU

---



When you select the mooring model icon on the main menu, you will see the Assembly Table Menu at the right.

The icons contained within this menu are designed to help you edit the Assembly Table. Access to a secondary menu containing all the standard table entries is provided by selecting the "Tables Entries" icon.

Viewing the table is made easier if you use the icons labelled "Table Top", Table Mid", and Table Bot". These three images should give you access to all the table entries. If the table is not visible, select the icon "Table On"

Pressing the "Build Model" icon will build a 3D model to the dimensions set forth in the Assembly Table.

**NOTE:** Do not delete any table figure or text representing an assembly in the table. An assembly can be "turned off" by simply replacing the Location Key text with a dash (-).

ASSY TABLE		
TEXT LINES TABLE		
DELETE MOVE		TOP
NEW COPY		MID
		BOTM
CHANGE TEXT		APPLY
EDIT TEXT		
XYD	RAD	-
ON TABLE	HELP	MDL MODE
OFF		DRAW
TABLE ENTRIES		
		
BUILD MODEL		
VIEW MODEL ↓		

Assembly Table Menu

## READING THE TABLE

---

### READING THE TABLE

---

Each entry in the table represents an assembly and is described below.

**NAME :** The current assembly name is contained in the first entry in the table. The names included in the standard table are used throughout the menu system to keep track of layering conventions. If possible, stick with these names and layering conventions.

**FROM :** The second entry is the name of the assembly whose end location serves as the starting point for the current assembly.

**SYMBOL :** A reference to the graphic symbol used to represent the termination of an assembly in the model. The available symbols are:

- RING represented by the symbol
- SINK represented by the symbol
- ANCH represented by the symbol
- MISC represented by the symbol

For example, an assembly which terminates in a ground ring will include the text RING in the symbol column.

**LAYER :** The layer on which the current assembly will be placed.

**KEY :** The Location Key represents the coordinate system used to position the end of the assembly. XYD (X,Y and depth), and RAD (Radius, Angle and Depth) are the two systems recognized by MIDAS. A dash (-) in this field indicates that the assembly is not to be included in the model.

**X, Radius, Y, Angle and Depth :** Measured in units of feet except Angle which is measured in degrees clockwise from North (top of drawing). Depth is entered as a negative value.

**REF :** The Reference field is included to allow locating an assembly relative to any other assembly or hardpoint in the

model. In the current version of MIDAS, ANGLE remains relative to North even if measured relative to another assembly. This can be changed if found to be inconvenient.

**LENGTH** : The true catenary length of an assembly, measured in feet. A dash in this field indicates that a length is not known or that the assembly is to be approximated in the model by a straight line. Length can be updated with the true length of the assembled components as calculated by the verification code if desired.

**WEIGHT** : Overall wet weight of an assembly measured in the units of pounds (lbs). A dash in this field indicates that a weight is not known. This value can also be updated with the true combined wet weights of the components if desired.

#### Catenary Curves

MIDAS provides the capability to create smooth catenary curves representing the various assemblies in the model. Catenaries will be computed for all those assemblies which have a number entered in the length column in the Assembly Table. If the length column contains a dash (-), the assembly will be approximated by a line.

These catenaries are for display and plotting purposes.

A characteristic of an assembly is that it has a smooth catenary slope along its length. Since hardpoints have been defined as discontinuities in the slope of a catenary, it follows that an assembly cannot contain any hardpoints except at the extreme ends. If the catenary contacts the sea floor, a straight line will be inserted between the point of contact and the next hardpoint, usually the anchor.

**NOTE** : The catenaries generated will be a good approximation for legs whose slope is less than 1/3 (rise is less than 1/3 of the run). Legs whose slope is greater than 1/3 will not produce accurate catenaries, hence should contain a dash (-) in the length column in the Assembly Table. These will be represented as straight lines and will appear red until the command "Mark Ent Clear All" is entered.



---

## EDITING THE TABLE

---

---

### EDITING THE TABLE

---

A Table Entries menu is provided in MIDAS expressly for editing the Assembly Table. The mooring "supericon" is again available which contains all of the names for the standard assembly names, as well as the three key location entries XYD, RAD and dash (-). Select one of these choices and point to the table entry you wish changed. MIDAS will replace the text you point to in the table with the text you have selected from the menus. The command "CHANGE TEXT" is used for entering numerical location data.

**NOTE :** All entries in the table must be in upper case only.

Once the table has been edited to your satisfaction, a three dimensional model can be built which reflects the data in the table. The assembly model, though actually measured in units of feet, is built in model units of inches. The CADDs command MEASURE LENGTH will give you the accurate number of units (feet) in each straight section of the mooring model. A catenary calculation will also be run which replaces the straight lines with catenary curves if actual assembly lengths and weights have been entered in the table. Catenary length will be approximately .94 of their true length. This 6% difference is caused by the curve approximation algorithm.

The model is built in three dimensions and is viewed in a CADDs view, just like any other CADDs model. If the model does not fit the predefined view, an icon is provided for standard CADDs viewing commands such as ZOOM VIEW OUT or IN.

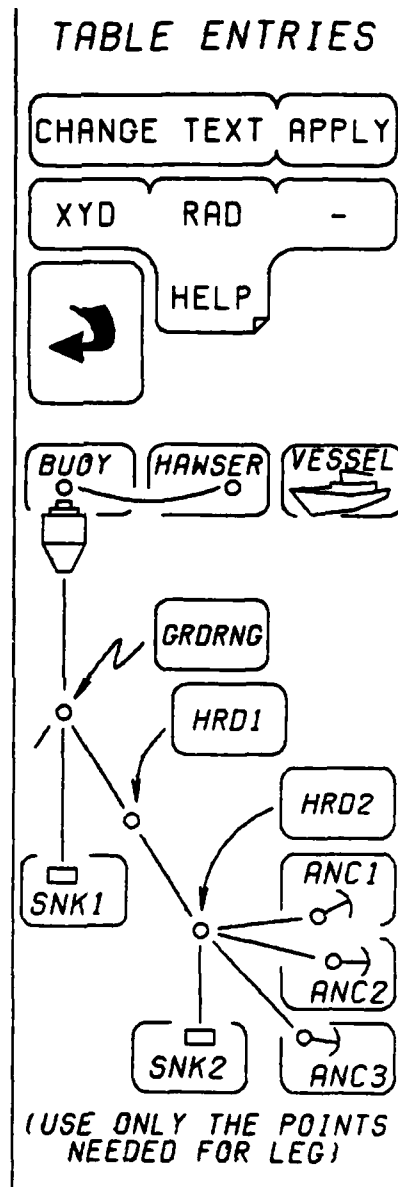


Table Entries Menu

## USING THE MODEL FOR CAE

---

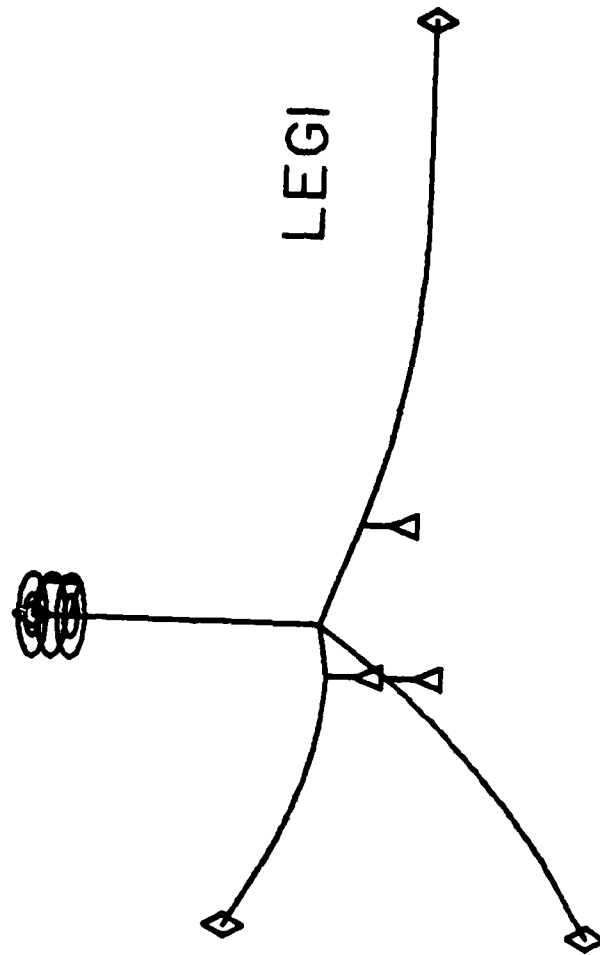
### USING THE MODEL FOR CAE

---

The model is an accurate representation of the mooring geometry as reflected in the assembly table. If the assemblies have been verified and the table updated, the lengths and weights indicated in the table will be an accurate reflection of the "actual" values. The table values can be output to a text file for use in subsequent mooring analysis. (Press the right half of the arrow shape in the Model menu.)

The three-dimensional model is useful primarily as input to subsequent mooring analysis, and as mentioned previously, can represent either the user specified model data, or can be updated after the two-dimensional assemblies have been built to reflect the "actual" assembly data. Since the analysis is only as accurate as the input data, MIDAS can automatically update the model data with the precise length and weight of each assembly as generated by the verification routines.

**NOTE :** It should be remembered that MIDAS does not reposition hardpoints automatically. All hardpoints locations are entered manually in the Assembly Table, hence should be checked carefully.



Sample MIDAS Model

## APPENDIX A - TROUBLE SHOOTING

---

The following circumstances may occur while using MIDAS.

### Menus Disappear

Certain CADDs commands will cause the CII menus to vanish. They will reappear again after typing:

- » REFRESH or REPAINT <CR>

### Menus Graphics Are Overwritten

CADDs commands such as ECHO GRID ON will cause the grid graphics to overwrite the on-screen menu graphics. The menus can still be used, and a REFRESH or REPAINT will clear them up.

### Can't Activate Dynamic Menus

CII and the conventional CADDs dynamic menus utilize the same hardware support, hence only one can be used at any one time. If you need to use a dynamic menu while in CII, simply type DEACTIVATE CII and activate your dynamic menu.

### CII Keypad Doesn't work

A special function called a DMVAR is used occasionally to accept input from the operator. This will be signified by the symbol --> at the end of the command text. Input must be from either the keyboard or tablet menu, it will not recognize input from the CII menus. A carriage return signals the end of a DMVAR input, and a [CTRL] Q will return you to the CADDs prompt.

### Menu Tabs Overlap Top Menu

Occasionally, four or more tabs will appear on the stacked menus and interfere with the upper panel menu. There is no damage caused by the overlap, but since the tabs have priority over the upper menu, select any upper level tab to clear the overlap.

---

**Menus Do Not Respond**

Push the ROTATE button on the ICU to make sure it is not set to a hardware zoom or scroll. (You can use this hardware zoom function to enlarge your menus, but they will not operate in any but the normal settings.)

If the menus still do not respond, check to see that the cursor turns blue when you select a menu icon. If not, there is a good chance that your system manager has loaded a new version of CADD5 without reloading the latest revision of MIDAS.

---

**Menus Are Out Of Place**

Check the ICU for hardware settings (See above).

---

**CADD5 Graphics Hidden After Zoom Draw**

The ZOOM WINDOW command is based on the original full screen size and is not aware that you are using part of the screen for menus. To avoid this problem, simply give extra space on the right side of your zoom window to compensate.

---

**Menu Text Garbled**

On some systems, a different text font has been substituted for the original CADD5 font. In particular, if font 11 has been changed, you may notice a problem. Call TAG for a work around.

---

**Menus Arcs Appear As Polygons**

The original MIDAS menu part extents were extended beyond 128. See your system manager or refer to the CII reference manual.

---

**Extra Lines Appear Across the Screen**

This will usually be caused by activating a particular menu page. This is caused by a problem in the original MIDAS menu part. See your system manager or refer to the CII reference manual.

**Menus are Incomplete**

Caused by problems in the original MIDAS menu part.  
See your system manager or refer to the CII manual.

**Menu Graphics Do Not Match the Commands**

Caused by creating new MIDAS menu commands without  
updating the graphics. See your system manager or refer to  
the CII manual.

## APPENDIX B - FIGURE BUILDING

To build a MIDAS figure, follow the steps outlined below. It is expected that the creators of MIDAS figures are experienced CADD users, hence some detail has been omitted. Details of description files and connections follow.

1) Copy and rename the standard MIDAS figure part CFPO1L.FM.FIGURE to a new name under the catalog CFPO1L.FM.

2) Activate Drawing B.

3) Place a CNODE at the origin (0,0) of the drawing. This represents the point where the component physically contacts a mating component. This will typically be located where the midline of the figure intersects the inside of the component section profile.

» INSERT CNODE:

4) Insert the property PDSIZE LEFT to this CNODE by typing:

» INSERT PROP PDSIZE 'LEFT' : CNODE

**NOTE:** This CNODE represents the point of contact nearest the sea surface and is usually either the same size or larger than the contact nearer the sea floor. If this is not the case with a particular figure, and the larger connection is nearer the sea floor, place this property on the second CNODE instead (See below).

5) Build the figure in model mode using a scale of .4 inch = 1 foot (.4" = 1'). The figure should be built as it would normally appear when connected in an assembly, with the sea surface to the left, the sea floor to the right. All figures including buoys should be built horizontally, as though they were lying flat on a deck, not vertically as they may be in the final mooring configuration.

All figures use a mating gap and corresponding section width of .1 inch.



6) Place a second CNODE at the point of contact nearer the sea floor. When complete, check each figure to make sure the "HLR" works in all cases and tweak the position of the second CNODE if necessary.

7) Insert the property PDSZE RIGHT to this CNODE by typing:

» INSERT PROP PDSZE 'RIGHT' : CNODE

8) Insert a bubble on the midline of the figure by typing:

» INSERT PART CFPO1L.FM.BUBBLE: NEAR

9) Trim the leader (TRIM ENT INTO:) to where it intersects the outermost profile of the figure and translate the tip of the arrow (TRANSLATE ENT:) to this new location. This will ensure that the bubble remains exactly 2 inches from the midline of the figure.

10) Change the bubble text to the correct find number by typing:

» CHANGE DIMENSION TEXT MAIN 'AB#':

where AB# is the correct find number of the component.

11) Insert a part property with this same find number by typing:

» INSERT PPROP STOCKNO 'AB#' <CR>

12) If a dimension is desired, insert the standard "dimension" and edit to suit:

» INSERT PART CFPO1L.FM.DIM:

13) Insert the property DRAWNO on all bubble graphics and all dimension graphics. This will allow MIDAS to automatically find all bubbles and dimensions and move them to a special drawing layer for plotting purposes.

Type:

» INSERT PROP DRAWNO:

**NOTE:** If you need to change the dimension text of the bubble or dimension after you have added the DRAWNO property, you must reinsert the DRAWNO property. CADD5 removes the property if the dimension text has been changed.

14) On all branching figures such as ground rings and spider plates, insert the part property IGNORE:

» INSERT PPROP IGNORE <CR>

15) On all figures whose length will be assigned by the user after insertion, such as variable length chain, assign a default length by inserting part property BLENGTH:

» INSERT PPROP BLENGTH 1 <CR>

16) Once you have completed the graphics and added the properties, file the part as a drawing mode extended nodal figure by typing:

» EXIT PART F NFIG DRAW B VIEW TOP ALL

17) Add a new entry which fully describes this component into the description file by typing:

» EDIT FILE CFPO1L.FM.DFILE <CR>

Copy an existing component description (contained within square brackets [ ]), and edit to reflect the current component.

---

## CONNECTIONS AND CNODES

Most MIDAS components have two connections which allow it to be joined into an assembly. These connections may be the same size, as in a length of chain, or one may be larger than the other as in an anchor joining link. These connections are represented in the figure by CNODES placed at the point of contact. To identify the ends, the property PDSIZE is added to the CNODES as follows:

» INSERT PROPERTY PDSIZE 'LEFT': CNODE

or,

» INSERT PROPERTY PDSIZE 'RIGHT': CNODE

By convention, the property PDSIZE LEFT is assigned to the CNODE located at the figure origin and in most cases will be the larger of the two connections. Some non-reversible figures may have the small end at the origin, but this would be unusual.

---

### Relationship to Attachment Check

The attachment check will check both connections of reversible components for fit. Components will be flagged

---

## SPECIAL CASE COMPONENT FIGURES

---

for fit violations only if they can't be "reversed" to fit (non-reversible), or an interference remains even after trying both connections.

---

## SPECIAL CASE COMPONENT FIGURES

---

In a few cases, a figure requires special handling, either due to a unique design trait, or due to a special purpose it serves in the mooring design. Two such cases are noted below.

---

### Ground Rings, Spider Plates, Equalizers, Etc.

---

A certain class of mooring figures are designed to branch from one assembly to two or more assemblies. These are characterized as having three or more CNODES. A restriction is that this type of figure cannot be used as the first figure in an assembly. If it is desirable to check the fit of two or more assemblies, use Point-to-Point verification and all selected figures will be checked.

**NOTE:** Spider plates and equalizers have three connect nodes. These are non-reversible components and have the LEFT CNODE at the origin. Both remaining connection nodes receive the property BDSIZE RIGHT.

**NOTE:** All figures which have more than two CNODES must contain the part property IGNORE and can be inserted only as the last component in any given assembly.

---

### Variable Length Components

---

Components whose length is determined by the user, must contain the part property BLENGTH (n). This property is then interactively changed by the user after insertion and is read by the verification code to determine length.

To denote this characteristic in the description file, place a negative one in the length field. If the weight is to be determined as a function of length, place a negative value for its weight per unit length (lbs/ft) in the weight field.

**Non-Reversible Components**

---

Most mooring components can be assembled without regard to direction. Chain is the obvious example. Other components such as anchors and buoys, have a definite direction, and cannot be reversed. Certain mooring criteria may dictate that a component be restricted to a given direction in the mooring assembly. To facilitate this, a field has been reserved in the definition file to indicate this characteristic. A YES indicates reversibility, while a NO indicates the component is non-reversible.

## DESCRIPTION FILE

### DESCRIPTION FILE

The MIDAS Description File contains a reference to every component in the MIDAS library. When a verification or B.O.M. is performed, the Description File is used as the source for all information relative to the figures.

Each new component must have its own entry in the description file. This file contains all of the relevant data concerning this component. Multiple views of the same component have the same find number and therefore will reference the same description file.

There are eighteen "fields" in the component description file reserved for each figure. These fields are in sequence and each consecutive field must be present in the file. The set of 18 fields denoting a complete component is in turn contained within square brackets [ ] to distinguish it from the next component.

#### Alphanumeric Data

Fields which contain alphanumeric data (text strings) such as find numbers must be contained within parentheses. If there is no available information for a particular alphanumeric field, simply place an empty set of parentheses to denote the presence of the field. Text strings may include matched sets of parentheses.

In the description field, each line of the description must be under 40 characters so that the Bill of Materials will print properly. You may include descriptions that are several lines long by continuing the description on a new line after the forty character line limit. Be sure to enclose the entire multi-line description within parentheses.

#### Numeric Data

Numerical fields are separated by spaces or carriage returns. If no data exists for a numeric field, enter a 0 separated by spaces or carriage returns.

---

**Field Format**

---

There is no limitation on the number of fields per text line, and fields can be continued on the next line. In the Description File supplied with MIDAS, each field is placed on its own line to make the file more legible.

---

**Comments Within the File**

---

All text to the right of a percent sign (%) will be considered a comment and ignored.

---

**Assigned Fields**

---

[ Start of Description

1. Find Number - 3 characters max (String)
2. Specification - 12 characters max (String)
3. Description - 30 char per line, no line limit (String)
4. Material (String)
5. Left Opening - inches (Numeric)
6. Left Section - inches (Numeric)
7. Right Opening - inches (Numeric)
8. Right Section - inches (Numeric)
9. Length - feet (Numeric)

Use a negative one (-1) in this field if the length will be found from a property on the figure.

10. Wet Weight - Pounds (Numeric)
- Use a negative value for lbs/ft if weight is to be found as a function of length.

11. Breaking Strength - Pounds (Numeric)
  12. Reversible - YES or NO (String - ALL CAPITALS)
  13. MIDAS Symbol Name - 3 characters (String - ALL CAPS)
  14. Vendor - (String)
  15. Shipping Weight - pounds (Numeric)
  16. Shipping Volume - cubic feet (Numeric)
  17. Cost - dollars (Numeric)
  18. Identification - (String)
- ] End of Description

SAMPLE DESCRIPTION FILE ENTRY.

SAMPLE DESCRIPTION FILE ENTRY.

[	% Start of description
(CS3)	% Find Number, 3 char max
(CSH0T901)	% Spec or Part No, 12 char
(Chain, Shot (90 Feet) 1.75 nominal,	
Link anodes to be attached as shown)	% Description
(Steel)	% Material
3.0	% Left Opening, inches
2.25	% Left Section, inches
3.0	% Right Opening, inches
2.25	% Right Section, inches
90	% Length, Feet
4250	% Wet Weight, lbs
570000	% Breaking Strength, lbs
(YES)	% Reversible ?
0	% Graphic symbol name
]	% End of description

In the above example, only the first thirteen fields were entered. It is not mandatory to complete all eighteen fields, but all fields used must be consecutive, hence, if it is important to include the information located in the last field, then all fields must be present. Blank text fields are represented by empty parentheses, blank numeric fields by a zero.

---

**APPENDIX C - TECHNICAL NOTES**

---

---

**INSTALLING MIDAS**

---

Installing MIDAS is a simple operation. Most of the work is performed by an execute file. All program files required for the MIDAS installation will be loaded from magnetic tape into the catalog: CII and DATA.CII. Part files and the description file will be installed into the catalog : CFPOIL.FM

(1) If MIDAS has previously been loaded on your system, edit the file DATA.VNP and delete the following entries that were added by MIDAS:

ACTIVATE MIDAS  
ACTIVATE GUIDE  
ACTIVATE TESTMENU  
ANALYZE MOORING  
DEACTIVATE CII  
GENERATE MOORING  
REFRESH 000  
PUT IDF  
PUT TABLE  
INSERT BOM

(2) The install file will automatically recompile the VNP. If the system level command MODCOMP is not installed on your system, it can be installed by typing:

» SYSCMTB CMTB.MODCOMP <CR>

(3) Again, if MIDAS has been loaded previously, edit the file DATA.PROP and delete the following properties that were added by MIDAS:

IDFETYP  
IDFCELL  
IDFLAYOUT  
IDFIMNAM  
IDFIMOFF  
TERMTYPE  
DATANODE  
PDSIZE  
BLENGTH  
STOCKNO  
IGNORE  
LIMB



## INSTALLING MIDAS

(4) Log on under a user name which has a default protection group of 0000. Many systems managers have a higher protection.

If you prefer, temporarily set your own default protection group to 0000 to ensure access by all users by typing:

» SETPROT 0000 <CR>

(5) Disable all local directories by typing:

» DSABDIR <CR>

(6) Mount the tape, attach the tape drive with the command:

» ATTACH MT,TAPE <CR>

(7) Copy the files required for installation with the command:

» COPY :MT//REPLACE=NEWER,  
CHECKSUM=NO, LIST=NO <CR>

(8) After ensuring that ALL TASKS ARE OUT OF CADDs (exited, not resumed) install MIDAS by typing:

» CII.MIDAS.INSTALL <CR>

When this execute file finishes, the installation of MIDAS is complete. All tasks can now re-enter CADDs. (8) Set the protection of the MIDAS menu source file to limit the write access to authorized users by typing:

» CHGPROT DATA.CII.120.&BCD.&IDF, (protection code) <CR>

(10) Log onto a DCU, set the protection group again to 0000, enter CADDs, and type in the command:

» ACT MIDAS <CR>

This will cause MIDAS to compile a new binary IDF under the 0000 protection group. Remember to set your protection back to 0000 any time a new MIDAS IDF is loaded, or if the menus are changed, requiring a recompile.

### Hardware Considerations

The MIDAS menus require the Computervision DCU workstation. MIDAS does not require an APU. All other

workstation peripherals, such as the keyboard and the tablet, can be active at the same time. There are no other hardware requirements.

---

**CATALOGS USED**

---

**CFPOIL.FM** - Contains all MIDAS menu parts, drawing forms, drawing figures, and MIDAS mooring components.

**CII.FLIB** - contains figures, parts and pulldown text files for CII and GUIDE. Not required to run MIDAS.

**CII.PORT** - contains software files needed for the installation. After the installation is complete, this catalog may be deleted.

**CII.MIDAS** - Install file, verb/noun table and properties. This catalog can be deleted after the installation.

**DATA.DOC.INSERT.BOM** - On-line help file

**DATA.DOC.ANALYZE.MOORING** - On-line help file

**DATA.DOC.PUT.TABLE** - On-line help file

**DATA.DOC.GENERATE.MOORING** - On-line help file


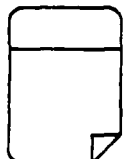
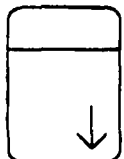
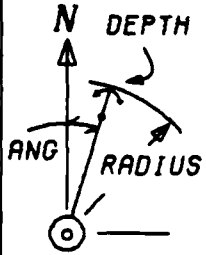
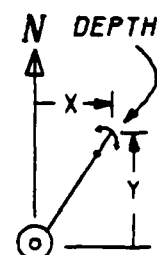
**DATA.CII.120.&IDF** - interface definition file for MIDAS

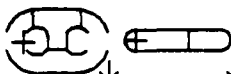

**DATA.CII.120.&ICON** - icon graphics file for MIDAS



**DATA.CII.HEADER** - file referenced by setup network figure

**TAG.CADDS** - Temporary files needed to load custom MIDAS CADDS commands. This may be deleted after the installation.

## APPENDIX D - MISCELLANEOUS MIDAS MENUS

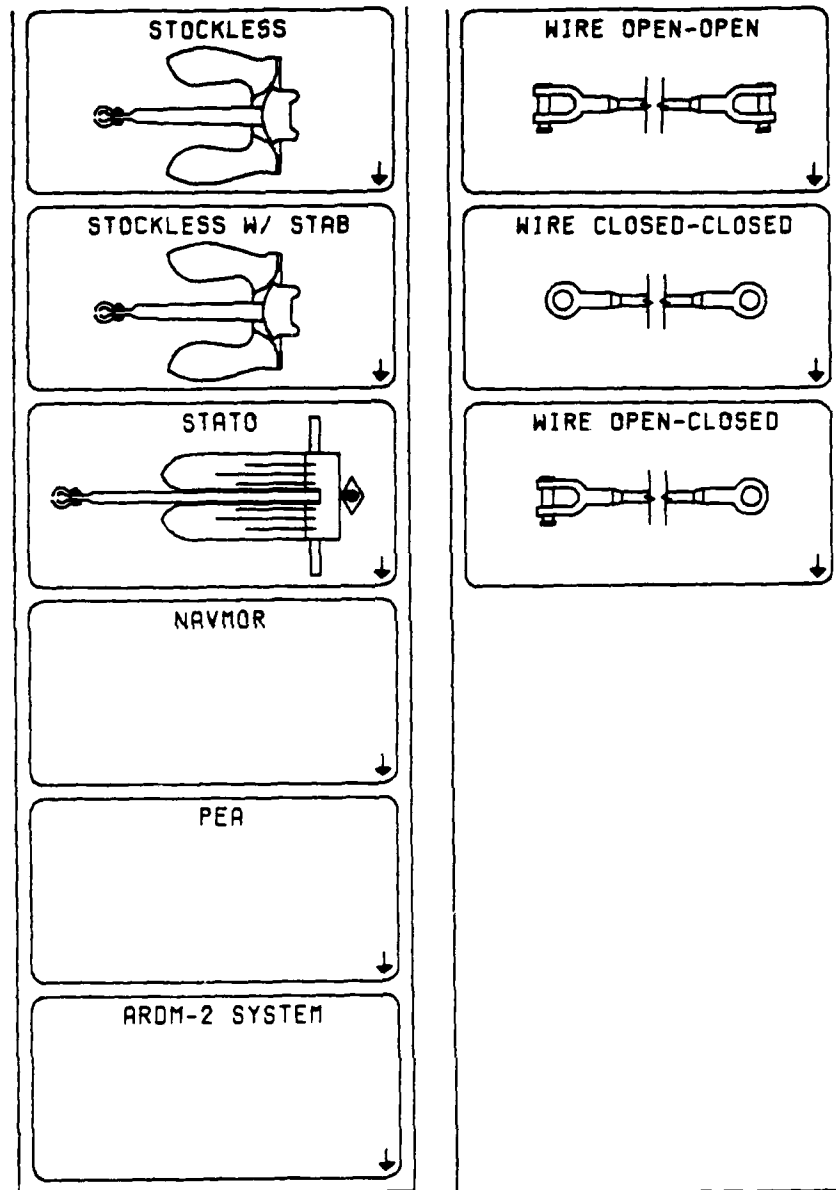
MIDAS MENUS	LOCATION KEY
<div data-bbox="462 598 586 745"> <div>ICON</div>  </div> <div data-bbox="619 619 809 693">COMMAND ICON</div> <div data-bbox="462 756 586 913">  </div> <div data-bbox="602 798 817 871">NEW MENU ICON</div> <div data-bbox="462 924 586 1081">  </div> <div data-bbox="602 966 817 1039">PULLDOWN ICON</div>	<div data-bbox="908 651 1115 903">  </div> <div data-bbox="916 934 1032 997">RAD</div> <div data-bbox="1131 651 1288 903">  </div> <div data-bbox="1172 934 1288 997">XYD</div> <div data-bbox="982 1039 1280 1092"> OR <div data-bbox="1040 1018 1164 1081">-</div> (OFF) </div>
<p>USE 3D TABLE ONLY IF A 3D MODEL IS TO BE BUILT. ALL OTHER FUNCTIONS WORK WITHOUT MODEL</p> <p>ALL ASSEMBLIES ARE PLACED ON THEIR OWN UNIQUE LAYER. BE SURE TO KEEP THE LAYERS STRAIGHT</p> <p>EACH ASSEMBLY CAN BE VERIFIED FOR ITS LENGTH, WEIGHT, AND BREAKING STRENGTH. A FIT CHECK IS DONE ON EACH COMPONENT</p>	<p>USE 'RAD' IN KEY BOX IF HARPOINT IS DEFINED AS AN ANGLE AND RADIUS WITH RESPECT TO THE BOUY</p> <p>USE 'XYD' IN KEY BOX IF HARPOINT IS DEFINED AS AN 'X' AND 'Y' WITH RESPECT TO THE BOUY</p> <p>PLACE A '-' IN KEY BOX IF HARPOINT IS NOT TO BE INCLUDED IN THE MOORING MODEL. THERE IS NO NEED TO DELETE LINE</p>

SELECT SIZE
2.50 2.75 ETC. ↓
END LINK
↓
PEAR LINK
↓
CHAIN JOINING LINK
 ↓ ↓ ↓
ANCHOR JOINING LINK
 ↓ ↓ ↓
LINK ANODE
↓

SELECT SIZE
2.50 2.75 ETC. ↓
SWIVEL. 2 LINKS
 ↓
SWIVEL. 1 LINK
 ↓
CHAIN SWIVEL SHACKLE
↓
RISER SWIVEL SHACKLE
↓
↓

Miscellaneous Menus

CATALOGS USED



Miscellaneous Menus

## DISTRIBUTION LIST

DTIC Alexandria, VA  
C/DEP OIC, Corona, CA  
NAVFACENGCOM Code 03, Alexandria, VA  
NAVFACENGCOM - CHES DIV FPO-1PL, Washington, DC  
NAVFACENGCOM - LANT DIV Library, Norfolk, VA  
NAVFACENGCOM - NORTH DIV Code 04AL, Philadelphia, PA  
NAVFACENGCOM - PAC DIV Library, Pearl Harbor, HI  
NAVFACENGCOM - SOUTH DIV Library, Charleston, SC  
NAVFACENGCOM - WEST DIV Code 04A22 (Lib), San Bruno, CA  
PWC Code 101 (Library), Oakland, CA Code 123-C, San Diego, CA Code 420, Great Lakes, IL Library  
(Code 134), Pearl Harbor, HI Library Guam Mariana Islands Library Norfolk, VA Library Pensacola, FL Library Yokosuka Japan Tech Library Subic Bay RP